

Appeal No. 2009-1029
(Serial No. 09/877,159)

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

IN RE DAVID M. BAGGETT

Appeal from the United States Patent and Trademark Office,
Board of Patent Appeals and Interferences.

BRIEF FOR APPELLEE DIRECTOR OF THE
UNITED STATES PATENT AND TRADEMARK OFFICE

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Representative claims (disputed elements emphasized)

1. A method of producing a constructed fare that includes an arbitrary added to a published fare, said method executed in a computer system having memory and a persistent storage device, the method comprising:

- [1] preprocessing by:

- determining interior cities that appear with gateway cities in arbitraries for an airline*, the arbitraries being published amounts and an order set of two cities that extend published fares that include an amount for travel between two cities to provide a bi-directional market; and

- [2] searching a database having published fares for gateway cities corresponding to the determined interior cities appearing in the arbitraries; and

- [3] producing the constructed fare, by:

- applying an arbitrary corresponding to one of the interior cities to a published fare involving one of the gateway cities that corresponds to the determined interior cities appearing in the arbitraries to produce a constructed fare; and

- storing the constructed fare in memory or the persistent storage device of the computer system for use in planning, faring and/or pricing.

11. The method of claim 1, further comprising:

- determining a second set of interior cities* that appear with a second gateway city in the published fare for the airline;

- applying an arbitrary that extends the published fare to a city from the second set of interior cities to produce a three component constructed fare.

2. The method of claim 1 wherein determining interior cities comprises:

- accessing a hash table indexed by an airline, interior-city pair to return a list of gateway cities for which an airline has arbitraries that specify the interior city.*

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STATEMENT OF RELATED CASES

The Director is not aware of any other appeal from the Board of Patent Appeals and Interferences in connection with application Serial No. 09/877,159 that has previously been before this or any other court. There is no known related case pending in this or any other court. The Director is also unaware of any other cases pending in this or any other court that will directly affect or be directly affected by this Court's decision in the pending appeal.

I. STATEMENT OF THE ISSUE

Baggett's representative claims are directed to a method of producing so-called "constructed" or "unpublished" airline fares for multi-step trips originating and/or ending in a minor city. For years, the airline industry has been publishing fares for various international markets, generally where that market is between two major cities, such as the DC to London (IAD-LHR) market. Because there are too many markets to publish such fares between all worldwide cities, especially those markets with minor cities, such as the Norfolk to London market (ORF-LHR), the airline industry developed a mechanism to "extend" published fares with "add-on" fares, or "arbitrary" fares, to derive a constructed price for travel starting and/or ending in a minor city. Thus, the airlines construct fares by combining an arbitrary fare (IAD-ORF) with a published fare (IAD-LHR) to arrive at a "constructed" fare for the entire trip (ORF-LHR).

Baggett admits that the airline industry has been producing these constructed fares for years. Baggett, however, contends that his particular method of producing these fares is different from the prior art. The principal issue on appeal is whether Baggett's particular method for producing constructed fares, which include the steps of: (1) "determining" the minor cities that connect to major cities for an airline; and (2) combining an arbitrary fare with a published fare to produce

a constructed fare, render his claims patentable. Another issue for one group of dependent claims is whether specifying the use of hash tables and indexes for organizing and accessing the fare data renders those claims patentable.

The question for this Court is whether substantial evidence supports the Board's finding that Baggett's representative claims are obvious over the prior art.

II. STATEMENT OF THE CASE

This appeal arose from the examination of a patent application, U.S. Serial No. 09/877,159, by David M. Baggett ("Baggett"). Baggett's application has 50 claims, which all relate to methods or computer programs for airfare construction. A54-A64. The patent examiner rejected the claims under 35 U.S.C. § 103, finding the claims would have been obvious to those of ordinary skill in the art based on: (1) U.S. Patent Publication No. 2002/0178034 A1, entitled "Airline Travel Technologies," issued to Christopher Gardner et al. ("Gardner"); (2) an Airline Tariff Publishing Company ("ATPCO") manual (the "ATPCO manual") which is published by ATPCO; and (3) Baggett's admitted prior art.

Baggett appealed the examiner's final decision to the Board of Patent Appeals and Interferences ("Board"), which selected 13 representative claims. The Board affirmed the examiner's rejection of 8 representative claims — claims 1, 9, 11, 12, 14, 16, 17 and 20 — and reversed the rejection of the other 5 representative

claims —claims 2-4, 21, and 52. The Board then entered new grounds of rejection for claims 2-4, 21, and 52, finding that Gardner, the ATPCO manual, the admitted prior art and two treatises --- *An Introduction to Data Structures with Applications*, Jean-Paul Tremblay & Paul G. Sorenson (2d ed. 1984) (“Tremblay”) and *File Organization for Database Design*, Gio Wiederhold (1987) (“Wiederhold”) rendered these 5 representative claims obvious.

On rehearing, Baggett argued that the Board erred with respect to representative claims 1, 2 and 9. The Board sustained its rejection of claims 1 and 2, but reversed its rejection of claim 9. Baggett now appeals to this Court.

III. STATEMENT OF THE FACTS

A. Background to Fare Construction

The airline industry defines three different types of fares: (1) a “published” fare; (2) an “arbitrary,” or add-on fare; and (3) a “constructed,” or unpublished fare. A999.¹ A published fare is the stated price for travel between two cities, referred to as a market (*e.g.*, DC-London, IAD-LHR). A100; A999. While airlines generally publish fares for travel between two major cities, too many markets exist worldwide for airlines to publish fares for *every* market, especially those international markets originating and/or ending at a small city (*e.g.*, Norfolk to

¹ Citations to the Joint appendix are referred to as A____; citations to the appellant’s brief are referred to as Br. at ____.

London, ORF-LHR; DC to Manchester, England, IAD-MAN; or Norfolk to Manchester, ORF-MAN). A100; A999; A1138.

An arbitrary fare, like a published fare, lists two cities (e.g., DC-Norfolk, IAD-ORF; London-Manchester, LHR-MAN). The first listed city is the major (or “gateway”) city, and the second listed city is the minor (or “interior”) city.² A100. Arbitrary fares can only be combined with a published fare — they are not stand-alone fares. A999. Airlines provide their published and arbitrary fares to ATPCO, and then ATPCO includes these fares in its database that is used for fare construction. A1041; A1000. Each fare is stored in a “record” in the database:

4.1.1 Fares

An amount published for use in pricing air transportation from one city to another city. The Fare Record and the Constructed Fare Record use the same record layout with appropriate fields coded.

ATPCO FARE RECORD												
Tariff No.	Carrier	Origin City/Country	Destination City/Country	Fare Class	Eff. Date	Disc. Date	Rule No.	Routing No.	OW/RT Indicator	Origin Currency	Footnote	Fare Amount
Bytes 1-3	Bytes 4-6	Bytes 7-11/12-13	Bytes 14-18/19-20	Bytes 21-23	Bytes 29-34	Bytes 35-40	Bytes 41-44	Byte 45-48	Byte 49	Bytes 65-67	Bytes 109-110	Bytes 200-211

A1041. Each fare record includes the particular airline, the origin and destination cities, as well as other information needed for fare construction. A1041.

A constructed fare is created by combining a published fare and one or two arbitrary fares:

² Baggett’s claims do not relate to local or regional fares. In other words, though airlines do publish fares between IAD and ORF, those regional published fares are not combined with other published fares to create a *constructed* fare. Two published fares could be “combined” in an itinerary, but no validity check would be required. A1183.

arbitrary + published fare = constructed fare
published fare + arbitrary = constructed fare
arbitrary + published fare + arbitrary = constructed fare.

See A100-101; A999.

In addition, the airline industry has developed a number of rules to make sure that the constructed fares are valid. *See, e.g.*, A942-A1158. For example, the major (gateway) city of the arbitrary fare must match one city in the published fare. A1143; A1056-A1060. So, a published fare from London to NYC (LHR-JFK) cannot be combined with an arbitrary from DC to Norfolk (IAD-ORF). Rather, a valid constructed fare would have to be either LHR-IAD/IAD-ORF or LHR-JFK/JFK-ORF. Other rules include ensuring the arbitrary and published fares come from the same fare class, and ensuring that the selected flights have available seats. *Id.* While the process of constructing a fare and ensuring the fare and the itinerary were both valid was historically done manually, this process has been computerized for years. A100-A105; A1142-A1148.

B. The Claimed Invention: A method of airfare construction

Baggett claims a particular method to make constructed airline fares. A54-A64. In his brief before this Court, Baggett combines the 13 representative claims that the Board selected into 4 groups.³

1. Representative claim 1 (2-component constructed fares)

Representative claim 1 states:

A method of producing a constructed fare that includes an arbitrary added to a published fare, said method executed in a computer system having memory and a persistent storage device, the method comprising:

[1] preprocessing by:

determining interior cities that appear with gateway cities in arbitraries for an airline, the arbitraries being published amounts and an order set of two cities that extend published fares that include an amount for travel between two cities to provide a bi-directional market; and

[2] searching a database having published fares for gateway cities corresponding to the determined interior cities appearing in the arbitraries; and

[3] producing the constructed fare, by:

applying an arbitrary corresponding to one of the interior cities to a published fare involving one of the gateway cities that corresponds to the determined interior cities appearing in the arbitraries to produce a constructed fare; and

storing the constructed fare in memory or the persistent storage device of the computer system for use in planning, faring and/or pricing.

³ Group 1 is represented by claim 1, Group 2 is represented by claim 11, Group 3 is represented by claim 2 and Group 4 is represented by claim 20.

A54 (contested element emphasized). In other words, representative claim 1 relates to a particular method for producing constructed fares made up of at least two components (arbitrary fare + published fare, or published fare + arbitrary fare).

More specifically, Baggett's method claims three steps to produce a constructed fare. Baggett's first listed step "determines interior [minor] cities that appear with gateway [major] cities for an airline." Although Baggett's claim does not specify how to "determine" interior cities, his specification explains that one can specify, or "determine" a minor (interior) city of interest (*e.g.*, Norfolk, because the trip will originate or end in Norfolk), and then search a database for only those arbitrary fares that include Norfolk as an interior city (*e.g.*, IAD-ORF or JFK-ORF) for a particular airline (*e.g.*, United). *See* A108. The specification also states that rather than choosing an interior city up front, one can search all arbitrary fares in the database, and produce a table by airline for the "determined" interior city showing the possible gateway cities. A106; A92.

Baggett's second step is to search the published fares in a database that have gateway cities that corresponds to the available gateway cities for the "determined," or selected interior city (*e.g.*, IAD-LHR or JFK-LHR). A54.

Baggett's third step is to produce constructed fares by first combining the arbitrary fares with the published fares that have a common city (*e.g.*, IAD-ORF

with IAD-LHR, and JFK-ORF with JFK-LHR), and then storing the constructed fares. A54. Baggett's claim language does not specify that the three steps must be performed in the order that they are written. A54.

As Baggett notes, step [1], the "determination of interior cities that appear with gateway cities in arbitraries," is one of the central novel features of his invention. Br. at 2. Baggett's invention lies in his concept that "not all interior cities are part of arbitraries for a given airline." Br. at 32; A105-A108. In other words, Baggett seems to view his invention as limited to searching for only those interior cities a given airline flies to and from, rather than a search of every possible city. *Id.*

2. Representative claim 11 (3-component constructed fares)

Representative claim 11 states:

The method of claim 1, further comprising:

determining a second set of interior cities that appear with a second gateway city in the published fare for the airline;

applying an arbitrary that extends the published fare to a city from the second set of interior cities to produce a three component constructed fare.

A55-A56 (disputed element emphasized). The only difference between representative claim 1 and representative claim 11 is that representative claim 11 is a three-component fare (2 arbitraries + a published fare). In other words,

representative claim 11 covers constructed fares for flights between two minor cities, e.g., Norfolk to Manchester, England (ORF-IAD-LHR-MAN).

3. Representative claim 2 (using indexes and hash tables)

Representative claim 2 states:

The method of claim 1 wherein determining interior cities comprises: *accessing a hash table indexed by an airline, interior-city pair to return a list of gateway cities for which an airline has arbitraries that specify the interior city.*

A54 (disputed element emphasized). Representative claim 2 specifies the use of a hash table indexed by an airline and an interior (minor) city pair that “returns” a list of gateway cities. A54.

Hash tables are commonly used in computer programs for storing and retrieving data, such as name lists, pricing tables and schedules. Hash tables commonly are used to store information because they provide an efficient way to search for and retrieve the stored information. Hash tables are indexed by a “key” (such as an airline name, or interior city or both) that is then used to search a database and return a “value” (such as a gateway city). A106-A107.

4. Representative claim 20 (memoization)

Representative claim 20 requires the additional step of determining whether data was memoized. A57. “Memoization” is an optimization technique used to speed up computer programs by avoiding repeating the calculation of results for

previously processed inputs. The term was coined by Donald Michie in 1968, and has been used in computing in a variety of contexts since that time.

C. The Prior Art

The Board relied on the following references in finding the representative claims obvious:

1. Gardner

Gardner discloses an automated travel system that constructs the lowest possible fare for travel, using published and constructed fares. A1159-A1192. When a customer inputs a desired itinerary, Gardner's system will search flight availability and published fare databases. A1182-A1183, ¶¶ 90-103. Gardner's system will also seek to determine unpublished fares. A1183, ¶¶ 98-101. Gardner's system will store the unpublished and published fares in an array, and provide a list of valid itineraries to the customer, identifying the lowest-priced itineraries. A1183-A1184, ¶¶ 98-104.; A1171. Although Gardner does not specifically mention arbitraries, it discusses determining unpublished fares, which by definition include at least one arbitrary. A101; A999.

More specifically, Gardner's system includes a "system core services" 22, which is configured to operate with a series of databases, including a flight schedule availability database and a published negotiated fares/rules database.

A1179, ¶ 38. Gardner's system obtains flight schedule availability down to the segment, or city-pair level. A1183, ¶ 92. Gardner's system also includes a "pricing services driver" 180 that receives pricing requests sends requests to fare retrieval and validation logic. A1183, ¶ 94. The pricing services driver 180 is coupled to various modules that work together to construct a fare. *Id.*, ¶ 95.

Gardner also has a "fare component identification module" 184 that identifies possible trip components (or city-pairs) within an itinerary, and prevents illogical components from being generated. *Id.*, ¶ 96. Gardner's "trip construction identification module" 186 identifies all possible combinations of trip constructions that can be used to price all specified travel. *Id.*, ¶ 97. For each trip component, the pricing service driver 180 calls the "unpublished fare retrieval/validation module" and the "published routings retrieval/validation module" to retrieve an array of unpublished fares. *Id.*, ¶¶ 98-99.

2. The ATPCO Manual⁴

The ATPCO manual details the various airline industry principles for constructing airline fares. A942-A1148. In addition, the ATPCO manual describes the various rules and limitations that govern the fare construction process. *Id.*; A101. For example, to produce a valid constructed fare, the arbitrary

⁴ This manual is produced by the Airline Tariff Publishing Company, which is an intermediary that maintains fares published by airlines and resellers.

fare and published fare must include one common city (the “gateway” city) to be valid. *Id.*

As described by the ATPCO manual, the travel industry uses constructed fares as a tool to create fares between two locations without having to publish fares for each possible combination of cities for which an airline wants to provide fares. A1035. The ATPCO manual defines a constructed fare, as a “combination of one or two [arbitrary fares] and a [published] fare amount resulting in an amount used in pricing air transportation from one city to another city.” A999; A1039. The ATPCO manual defines a published fare as one that is published for use in pricing air transportation between two cities. A999; A1040; A1058. ATPCO defines an arbitrary fare as an amount published for use only in combination with published fares to produce “constructed” fares. A999; A1039; A1058.

The ATPCO manual describes the computer logic it uses for construction fare processing, and provides examples. *See, e.g.,* A1004; A1041; A1131; A1142.

FARE RECORD							ADD ON RECORD						
Orig City	Dest City	Eff. Date	Disc. Date	Rtg. No.	Fmt.	Fare Amt.	Orig City	Dest City	Fare Amt.	Eff. Date	Disc. Date	Rtg. No.	Fmt.
BUF	LON	03/27/01	11/08/01	MPM		1000.00	LON	MAN	75.00	03/01/01	9999999	MPM	
BUF	LON	03/27/01	11/08/01	MPM		1000.00	LON	MAN	30.00	01/01/01	9999999	50	

CONSTRUCTED RECORDS CREATED FOR 03/27/01 - 11/08/01.

A1131. First, compatible published and arbitrary fares are grouped together by the market and fare class of the unpublished fare they may construct. A1004. Once other fare construction rules are applied to the data, the data is sorted. A1005.

Finally, once the data is sorted, constructed fares are produced. A1006; A1131-A1140. The ATPCO manual also describes a number of "pre-construction," or pre-processing steps, including obtaining and cataloguing arbitrary origin and destination information to update its data tables. A1146.

3. Tremblay and Wiederhold

Tremblay is a treatise describing data structures used for computer programs. A935-A937. In computer science, data structures are a way of storing data in a computer so that it can be used efficiently. Different kinds of data structures are suited to different applications. As explained in Tremblay, indexes, edge lists, and linked lists are structures that are suitable for graphs that have a large number of nodes. A935-A937. These structures allow graphs to be represented by a list, which can then be easily stored in memory. *Id.*

Wiederhold is a treatise of methods for storing data in files used for computer programs. A938-A941. Wiederhold describes the use of hashed files. *Id.* Wiederhold notes that hashed files are frequently used for things like directories, pricing tables, and schedules. A940. Wiederhold notes that the outstanding feature of hashed files is that the records can be accessed in constant time. A941. Wiederhold also identifies numerous sources for various hashing techniques and algorithms that have been used. A940-A941. Both treatises

present information known to those of ordinary skill in data systems and programming arts.

D. The Board Decisions

Because Baggett argued his claims to the Board in various groups, the Board selected 13 representative claims — claim 1 (representative of, or for, claims 1, 7, 8, 10, 13, 22, 28, 30, 31 and 34); claim 14 (for claims 14, 15, 19, 35, 36, 40, and 43-46); claim 17 (for claims 17, 18, 38-39); claim 12 (for claims 12 and 33); claim 11 (for claims 11 and 32); claim 16 (for claims 16 and 37); claim 2 (for claims 2 and 23); claim 3 (for claims 3 and 24); claim 4 (for claims 4-6 and 25-27); claim 21 (for claims 21 and 42); claim 52 (for claims 52-55); claim 9 (for claims 9 and 29); claim 20 (for claims 20 and 41). A10-A33.

On appeal to this Court, Baggett further collapsed these 13 representative claims into 4 groups, and argues one representative claim for each of these groups. *See Br.* at 17-21. For ease of reference, the USPTO uses the same representative claims for each of the groups that Baggett does. Thus, claim 1 represents Group 1 (which also includes claims 12, 14 and 17); claim 11 represents Group 2 (which also includes claim 16); claim 2 represents Group 3 (which also includes claims 3, 4, 21 and 52); and claim 20 represents Group 4. We discuss the relevant portions of the Board's decisions below.

1. The Board's Initial Decision

The Board affirmed the Examiner's rejection that representative claims 1, 9, 11, 12, 14, 16, 17, and 20 were rendered obvious by the combination of Gardner, the ATPCO manual and Baggett's admitted prior art. A20-A28.

The Board noted that the examiner found that Gardner described all of the limitations of claim 1 except for arbitraries and that the ATPCO manual described using arbitraries to produce constructed fares. A22. In affirming the examiner's conclusion that representative claims 1, 9, 12, 14, 17, and 20 were obvious, the Board stated that one of ordinary skill in the art would have applied the ATPCO manual's method of producing constructed fares and use of arbitraries to Gardner's airfare pricing system. A22.

The Board also found that, given that Gardner disclosed storing valid constructed fares (which, by definition, include a published fare and one or two arbitrary fares that can properly be combined), some "preprocessing" to determine interior cities (as claimed by Baggett) necessarily occurred. A22. The Board also found that ATPCO provided specific details about how to search for arbitraries and construct fares. *Id.* The Board further noted that because constructed fares require that both the published fare and the arbitrary have the same gateway city (*i.e.*, one city in common), and because of the way arbitrary fares are stored, one necessarily

determines the interior city that appears with the gateway city in an arbitrary when determining, or selecting that arbitrary. *See* A23-A24. The Board therefore found that step [1] in Baggett's claim was necessarily performed by Gardner's system or by ATPCO's fare construction methods. A23-A24.

The Board further found the only way to ensure that the gateway city is the same for both the published fare and the arbitrary fare is to search for only those published fares that have that same gateway city. A24. The Board then noted that the fact that a given arbitrary fare may only be combined with a subset of published fares necessarily requires searching among all of the published fares for those that may be validly combined. A24. Thus, the Board found that Gardner disclosed step [2] of Baggett's claim. A24-A25.

Finally, the Board found that all of the constructed fares stored in Gardner's system were produced and stored in the same way as that of step [3] of Baggett's method. A23. For representative claims 11 and 16, which include the additional limitation of determining a second set of interior cities, the Board found that ATPCO discloses extending a published fare with a second arbitrary. A27; *see also* A999.

The Board reversed the Examiner's rejection of representative claims 2-4, 21 and 52, however, and entered a new ground of rejection. A25-A26. The Board

found that “accessing a hash table indexed by an airline, interior-city pair to return a list of gateway cities” was not disclosed in the prior art relied on by the Examiner. A29. Nonetheless, the Board entered a new ground of rejection for those claims, and found that the missing limitation was found in Tremblay and Wiederhold. A29-A30.

The Board found that the basic structure for airline fare data is a graph, and that an effective data structure for representing such graphs is an edge list. A30. The Board found that the edge list could be indexed by each origin city and/or airline. A30-A31 (*citing* Tremblay). The Board further found that hash tables are one of the oldest data structures and are known to be appropriate for pricing and schedules. A30-A31 (*citing* Weiderhold). The Board found that indexing and hash tables were obvious methods to store and access airline fare and routing data. A30-A33. The Board therefore found representative claims 2-4, 21, and 52 were obvious over Gardner, ATPCO, the admitted prior art, Tremblay and Wiederhold.

Finally, the Board also found that Baggett’s remaining arguments in favor of patentability were not commensurate with the scope of the claims. A24-A27. Specifically, the Board found that Baggett’s arguments that “there are no teachings of constructing a database of gateways based on interior cities appearing in arbitraries” was not found in any of the claims, as the claims did not specify how a

database of such arbitraries was constructed. A24. The Board further found that Baggett's argument that the methods disclosed in the ATPCO manual for producing constructed fares was more time consuming and less efficient than his method did not negate the fact that the prior art disclosed processes that included a search to find arbitrary fares that had an interior city with a gateway city, and a search to find published fares that had the same gateway city as that in the arbitrary fare city pair. A24-A25. Thus, the Board found that Baggett's arguments did not overcome the Examiner's *prima facie* case. A10-A30.

2. The Board's Decision on Rehearing

Baggett filed a Request for Rehearing, seeking reversal of the Board's decision with respect to representative claims 1, 2 and 9. A904-A923. The Board affirmed its decision with respect to representative claims 1 and 2. As part of this decision, the Board found that Baggett's arguments attacked the references individually, which was improper. A6. But in response to Baggett's argument that the Board misapprehended representative claim 9 by referring to "memorization," rather than "memoization," as recited in the claim, the Board found that because the Examiner had also misread the term, he put forth no evidence in the record that described memoization. The Board therefore reversed the Examiner's rejection of representative claim 9. A8-A9.

IV. SUMMARY OF THE ARGUMENT

Baggett seeks to broadly claim a method for producing constructed airline fares for travel to and/or from minor cities. Baggett's problem is that methods (both by hand and using computer programs) for producing constructed airline fares were well-known in the art, a point that Baggett even concedes.

To try to differentiate his claims, Baggett argues that he has reduced the processing time for producing constructed fares, by *first* "determining interior [minor] cities that appear with gateway [major] cities in arbitraries for an airline." In other words, Baggett argues his invention takes advantage of his recognition that each airline only flies to a limited number of minor cities. But as explained by the Examiner and the Board, the prior art either directly or necessarily discloses the steps Baggett claims in his method. Additionally, Baggett's arguments are largely premised on details in his specification that do not appear in his claims.

Moreover, adding requirements for using well-known computer data storage and manipulation devices, such as indexing or hash tables, do not make his claims patentable. Substantial evidence therefore supports the Board's conclusion that representative claims 1 and 11 are obvious in view of Gardner, the ATPCO manual and Baggett's admitted prior art. Substantial evidence also supports the Board's

conclusion that representative claim 2 is obvious in view of Gardner, the ATPCO manual, the admitted prior art, Tremblay, and Wiederhold.

V. ARGUMENT

A. The Standard of Review

Whether an invention would have been obvious is a legal question based on underlying findings of fact. *In re Thrift*, 298 F.3d 1357, 1363 (Fed. Cir. 2002). What a reference teaches is a question of fact. *Para-Ordnance Mfg., Inc. v. SGS Importers Int'l, Inc.*, 73 F.3d 1085, 1088 (Fed. Cir. 1995). This Court reviews the Board's underlying factual findings for substantial evidence, and the Board's ultimate determination of obviousness without deference. *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). This Court has defined substantial evidence as that which "a reasonable mind might accept as adequate to support a conclusion." *Id.* at 1312. "[W]here two different, inconsistent conclusions may reasonably be drawn from the evidence in record, an agency's decision to favor one conclusion over the other is the epitome of a decision that must be sustained upon review for substantial evidence." *In re Jolley*, 308 F.3d 1317, 1329 (Fed Cir. 2002).

B. The Board Correctly Found that Representative Claim 1 is Obvious Over Gardner, ATPCO and Baggett's Admitted Prior Art

A claimed invention is unpatentable if the differences between it and the prior art are "such that the subject matter as a whole would have been obvious at

the time the invention was made to a person having ordinary skill in the art.” 35 U.S.C. § 103(a). In assessing whether subject matter would have been obvious, the Board first (1) determines the scope and content of the prior art, (2) ascertains the differences between the prior art and the claims at issue, and (3) resolves the level of ordinary skill in the art. *In re Kahn*, 441 F.3d 977, 985 (Fed. Cir. 2006); see also *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1 (1966). Against that factual background, the Board then determines whether the subject matter would have been obvious to a person of ordinary skill in the art at the time of the asserted invention. *Id.* During *ex parte* prosecution, the USPTO is required to give claims their broadest possible interpretation consistent with the specification. *In re Hyatt*, 211 F.3d 1367, 1371-72 (Fed. Cir. 2000).

Once the examiner sets out a *prima facie* case of obviousness by presenting evidence that “the missing descriptive matter is necessarily present” in the references and that it would be so recognized by persons of ordinary skill, it can require an applicant to prove that the prior art product does not necessarily or inherently possess the characteristics of his claims. See, e.g., *Cont’l Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991); *In re Best*, 562 F.2d 1252 (CCPA 1977).

1. **Baggett does not dispute that the combination of Gardner, ATPCO and the admitted prior art disclose every limitation of claim 1 except “determining interior cities that appear with gateway cities in arbitraries”**

Representative claim 1 recites a method of producing a constructed fare that requires: (1) determining interior cities that appear with gateway cities in arbitraries; (2) searching a database to find corresponding published fares; and (3) producing a constructed fare by combining an arbitrary fare with a published fare and storing that fare. A54. As the Board found, Gardner expressly describes all of the limitations of Claim 1 except for arbitraries, and ATPCO describes arbitraries and methods for constructing fares. A21-A24. Baggett does not dispute that the prior art teaches all of the limitations of claim 1 except “determining interior cities that appear with gateway cities in arbitraries.” Br. at 32-34. Nor could he in light of the express teachings of Gardner, the ATPCO manual and the admitted prior art.

With respect to step [2] of claim 1, which requires “searching a database having published fares . . . ,” both Gardner and the ATPCO manual describe searching a database having published fares. *See, e.g.*, A1183, ¶¶ 91-98; A1004.

With respect to step [3] of claim 1, which requires “applying an arbitrary. . . to a published fare . . . to produce a constructed fare,” the Board found that this step was simply the computation taught by ATPCO. A4. This finding is supported by substantial evidence. The industry-accepted definition of a constructed fare, as

Baggett himself admits, is an arbitrary fare plus a published fare. A999. The rules involving constructed fares state that an arbitrary fare can be combined with a published fare only if various rules are satisfied. A100-A105; A994-A1148. Thus, once the particular interior cities that appear with gateway cities in arbitraries for any given airline are determined (step [1]), and once the database for published fares that have a matching major (gateway) city with the arbitraries (step [2]) is searched, if the other rules are satisfied, that arbitrary can be “applied” to or combined with a published fare (step [3]) to create a constructed fare. A4. ATPCO (and Gardner) also explicitly reference storing constructed fares. A1131-A1140; A1146; A1183, ¶¶ 0097-0104; *See also*, A1058 (showing sample records for Boston-Manchester; Boston-Buffalo; and NYC-Buffalo). Thus, steps [2] and [3] of representative claim 1 are disclosed in the prior art.

2. Gardner, the ATPCO manual, and the admitted prior art also disclose “determining interior cities that appear with gateway cities in arbitraries”

Baggett argues that the “determining interior cities” limitation takes advantage of his recognition that “not all interior cities are part of arbitraries for a given airline.” Br. at 32. In other words, Baggett recognizes that not all airlines fly to and from all minor (interior) ones. Anyone who has flown to and from a minor city knows that. But more importantly, the Board found that the Gardner

system and the ATPCO manual necessarily perform this step. A23. The ATPCO manual notes that each airline must identify which markets, or city pairs (whether major-major or major-minor), are eligible for construction. A957. The ATPCO manual notes that arbitraries are published by airline carrier and routing cities (origin and destination) as well as other criteria. A960; A1041. The ATPCO manual also notes that one can limit a search of its records by choosing various options, including limiting the search by a particular city pair (e.g., gateway (major) - interior (minor) city pair). A957. The ATPCO manual also notes that it checks for valid gateways for each airline. A958.

Additionally, as the Board found, the ATPCO manual describes all of the various rules for constructing fares, fare construction logic and preprocessing. A22-25 (*citing* A994-A1148). This includes making sure that a particular arbitrary can be combined with a published fare through a shared gateway city to produce a valid constructed fare. *Id.*

The ATPCO manual also discusses an “extraction” process, whereby compatible published and arbitrary records are grouped together by the market and fare class of the unpublished record they may construct. A1150. After other “extract” steps are completed, the ATPCO manual describes the “sorting” logic, whereby the records are sorted. A1151. Finally, ATPCO describes “applying the

construction.” A1152-A1156. Thus, though ATPCO’s “determination of interior cities” may not be done using the specific algorithm in Baggett’s specification, it is done in the broad manner specified in claim 1.

As found by the Board, the ATPCO database stores its fares, both published and arbitrary, by market pairs. A21-A23. Thus, when processing the data to look for valid arbitrary fares that could be combined with a particular published fare, because one of the cities in the published fare must match the major (gateway) city in the arbitrary fare, and because the arbitraries are stored as a city pair, this processing necessarily determines the minor (interior) city for an airline. A23. In fact, ATPCO states that the arbitrary and published records are to be grouped together by market, which is a city pair. A100; A1150. Thus, as the Board found, Baggett’s “determining interior cities” step of Claim 1 necessarily occurs in ATPCO’s fare construction logic.

Baggett’s argument in favor of patentability heavily rests on an algorithm disclosed in his specification. *See, e.g.*, Br. at 8-17; 28-30; 33-35. In fact, Baggett’s brief cites to numerous pages from his specification and drawings to explain his 4-step algorithm try to show why his claim is patentable, although none of that detail is in claim 1. Br. at 8-17. Baggett merely claims the idea of “determining interior cities that appear with gateway cities in arbitraries” as step

[1] of his method. Baggett does not claim a particular means for determining, or selecting minor (interior) cities. Accordingly, the details in Baggett's specification cannot be relied upon to establish patentability of his claims. *E-Pass Techs., Inc. v. 3Com Corp.*, 343 F.3d 1364, 1369 (Fed. Cir. 2003) (claims must be interpreted "in view of the specification" without importing limitations from the specification into the claims).

Moreover, Baggett argues that Gardner does not disclose or renders obvious "determining interior cities that appear with gateway cities in arbitraries for an airline." Br. at 32-34. Baggett's argument attacks Gardner individually, even though the Board's rejection is based on a combination of references. *Id.* In fact, in challenging the Board's rejection of claim 1, Baggett completely ignores the Board's findings explaining how the ATPCO manual protocols combined with Gardner and the admitted prior art renders claim 1 obvious. Instead, Baggett focuses solely on Gardner. Br. at 32-34. Baggett's arguments therefore cannot establish nonobviousness. *See In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).

More importantly, Baggett admits that much of what he claims is known. A100-A104. Baggett notes that ATPCO promulgates industry-wide rules regarding fare construction, permitting "one arbitrary and one base fare or two

arbitraries and a base fare. . . [but] not permit[ing] more than two arbitraries.”

A111. Baggett admits that the prior art used a computer system to store the published fares, arbitraries, fare construction tables, and rules for constructing fares. A101-A105. Baggett also admits that the prior art systems searched and sorted the data provided by ATPCO to provide a database of valid constructed fares. A105. Baggett identified one prior art computer algorithm that sorted the data by interior cities, though that sort was not done first. A105. Baggett also notes that for any particular city, there is a manageable number of arbitraries. A112. Therefore, as the Board correctly found, one of ordinary skill would have applied ATPCO’s fare construction methods and use of arbitraries to derive step 1 of claim 1, given Baggett’s admitted prior art.

Because Baggett does not show that Gardner or ATPCO *do not* necessarily disclose “determining interior cities that appear with a gateway city in the published fare for the airline,” it has not met its burden of rebutting the examiner’s *prima facie* case. Because substantial evidence supports the Board’s decision for representative claim 1, it should be upheld.

C. Representative Claim 11, Which Merely Adds a Second Arbitrary to a Constructed Fare, Is Obvious Over the Prior Art

Representative claim 11 claims a method for producing constructed fares for three-part constructed fares; namely, arbitrary + published fare + arbitrary. More

specifically, representative claim 11 adds the limitations of “determining a second set of interior cities that appear with a second gateway city in the published fare for the airline,” and “applying an arbitrary that extends the published fare to a city from a the second set of interior cities to produce a three component constructed fare.” A55-A56. The only difference between representative claim 11 and representative claim 1 is that claim 11 describes producing constructed fares with two arbitraries, rather than one. The ATPCO manual defines this type of constructed fare (A999), and provides a number of examples of these constructed fares. *See, e.g.*, A1117 (Buffalo-Boston-London-Manchester); A1000 (Richmond, NYC-London-Aberdeen).

As discussed more fully above in Section B.2, as the Board found, when determining the arbitrary fare for a particular gateway city, the interior city is necessarily “determined,” or identified. It is no different whether one is searching for one arbitrary or two arbitraries to “extend a published fare,” as Baggett admits the prior art does. Thus, for the same reasons that the Board found that the prior art necessarily disclosed “determining interior cities that appear with gateway cities in an arbitrary,” it likewise disclosed “determining a second set of interior cities.” A27. Because substantial evidence supports the Board’s finding that

representative claim 11 would have been obvious over the prior art, its decision should be upheld.

D. Because Using Hash Tables and Indexes are Well-Known to Those Skilled in the Art, Representative Claim 2 Would Have Been Obvious

Representative claim 2 recites the additional limitation of “accessing a hash table indexed by an airline, interior-city pair to return a list of gateway cities for which an airline has arbitraries that specify the interior city.” A54. The Board found that this all this limitation added to the claims was to specify well-known data structures that were commonly used to store information such as airline routes, fares, and related data. A26-A30.

1. Hash Tables Are Well-Known to be Appropriate for Pricing and Schedules

The Board found that given Weiderhold’s disclosure that a hash table is “one of the oldest data structures” and “is known to be appropriate for pricing and schedules,” using hash tables to search for and access airline fare data by airline and city-pair would have been obvious to one skilled in the art. A31. As Weiderhold indicated, hashed files are used to efficiently find items in a database. A940-A941. Hashing may match several different search terms (such as airline or gateway city) to a data record. *Id.* It transforms the search term to a number that is used to locate the desired location of the data record (called a “bucket”). A940.

The ATPCO manual refers to buckets. *See* A1150. The Board therefore found that given that using hash tables, or hashed files was a well-known efficient way to store data for efficient searching of pricing and schedule data, representative claim 2 was obvious over Gardner, ATPCO, the admitted prior art, Tremblay and Wiederhold. A30-A33.

Baggett argues that neither Gardner nor the ATPCO manual suggest using a hash table, but he provides no evidence showing that hash tables were not used. Br. at 37-38. Baggett also seems to quibble with the use of the term “hashed files” rather than “hash tables” (Br. at 37), but nowhere provides evidence that these two terms are not interchangeable.

2. Indexes and Edge Lists Are Well-Known Structures for Graphs like that used in the Airline Industry for Routing and Fares

The Board found that an airline fare data structure is essentially the same as an airline route structure, but with fares instead of distance. A30. The Board also found that an airline route structure is a graph having a node for each origin and destination and an edge for each flight between each origin and destination pair (such structures are found at the back of most airline magazines). A30. Although neither Gardner nor ATPCO specify the particular data structure they use to access and sort the airline fare data to produce constructed fares, the Board found that both necessarily used graphs. A30. The Board then found that an effective data

structure to represent a graph, such as an airline route structure was an edge list. A30.

The Board cited Tremblay to show that the use of indexes, edge lists, and linked lists were used by programmers to efficiently and simply convey data structures. A30-34 (*citing* A936-A938). The Board specifically noted that Tremblay explained that the approaches it describes are suitable for graphs that have a large number of nodes. The Board then found that an airline routes and fares such as those described in the ATPCO manual and Gardner were such graphs.

Specifically, ATPCO states that it publishes arbitraries according to carrier, fare class, and routing (origin and destination cities). *See, e.g.,* A960; A1007; A1145. ATPCO discloses selecting its records by airline, by the city pair, by the gateway (major) city and/or by fare class. A957. Baggett admits that arbitraries list the gateway (major) city with the interior (minor) city. A100. Thus, the evidence shows that, in the case of arbitraries, the edge list would be indexed by the airline, the gateway (major) city and other criteria. A100; A957-A960; A1007; A1145. The Board therefore found that given the disclosure in Tremblay, it would have been obvious to one of ordinary skill to use edge lists to index the databases used in Gardner and ATPCO's systems. A30-A34. The Board then found that the

cited prior art cited would lead one of ordinary skill to access hash tables which are indexed by airlines and interior cities to return a list of gateway cities. A1-A7; A30-A34.

Rather than provide any evidence to show that the airline industry uses a different data structure, Baggett merely argues that another structure is possible. Br. at 36. Argument cannot take the place of evidence, however. *In re Budge Mfg. Co., Inc.*, 857 F.2d 773 (Fed. Cir. 1988) (argument is not evidence, also noting that the USPTO does not have the resources to obtain affidavits). The Board therefore had substantial evidence to support its finding that representative claim 2 is obvious over the prior art.

3. The Board Satisfied Its Burden of Showing Why a Person of Ordinary Skill would be Motivated to Use a Hash Table with Gardner, the ATPCO Manual and the Cited Prior Art

Citing *KSR Int'l Co., Inc. v. Teleflex, Inc.*, 550 U.S. 398 (2007) and *Takeda Chem. Indus., Ltd. v. Alphapharm Pty., Ltd.*, 492 F.3d 1350 (Fed. Cir. 2007) Baggett argues that the Board failed to explain why one skilled in the art would have been motivated to use a hash table and indexing to produce "constructed" fares as set out in Gardner, the ATPCO manual and the admitted prior art. Br. at 38-40. The Board, however, provided a detailed explanation of why one skilled in the art would be motivated to use hash tables as a mechanism for efficiently

retrieving stored data related to fare pricing, routes and airline carriers, and to use indexing and edge lists to store this data. A19-A21; A28-A31; A5-A7.

Specifically, the Board noted that Weiderhold established that one skilled in the art would be aware of hash tables and their frequent use in pricing tables, schedules, name lists and other applications. A30 (*citing* A938-941). The Board found that “Weiderhold provided the explicit rationale for applying hash tables to Gardner” because hash tables are frequently used in applications like that disclosed in Gardner (accessing fare, airline and city-pair data to produce constructed fares) because of its superior access time. A6. The Board also noted that hash tables were one of the oldest data structures used for disk files and were known to be appropriate for the types of applications such as airfare construction disclosed by Gardner and the ATPCO manual. A31. As the Supreme Court noted in *KSR*, “[u]nder the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* at 1742. In other words, “[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp.” *Takeda Chem.*, 492 F.3d at 1359 (*citing KSR*, 127 S.Ct. at 1732). The Board found

that hash tables, or hashed files, and indexing were well-known data structures in the computer field. The Board also found that these structures were known to work well for data such as airline routing and fare information, and therefore one of ordinary skill would have a good reason to "pursue" using hash tables and indexing.

The Board then found that all of the elements of Baggett's claims were disclosed in the prior art, or necessarily done by the programs described in the prior art. A1-A33. Baggett failed to rebut the Board's findings on this point. But even if Baggett had been able to provide evidence that the prior art programs disclosed in Gardner and ATPCO did not operate in the same way as the method in his claims, Baggett's idea that not all airlines fly to minor cities does make his method patentable.

E. With Respect to the Group 4 Claims, Baggett Only Asked the Board to Reconsider Representative Claim 9

In its original decision, the Board affirmed the examiner's rejection of claims 9, 20, 29, and 41. A26-A28. Because Baggett argued claims 9 and 29 as a group, and claims 20 and 41 as a group, the Board selected representative claims 9 and 20. A26. In Baggett's request for rehearing, Baggett asked the Board to reconsider its decision with respect to representative claim 9, arguing that the

Board had misread the term "memoization" in claim 9 as "memorization." A919-A921; A904-A923.

The Board agreed, also noting that because the Examiner had also misread that term in claim 9, the prior art in the record before it did not describe memoization. A7. The Board therefore reversed the rejection of representative claim 9, which included claim 29 under 37 C.F.R. § 41.37(c)(1)(viii).

Although Baggett *did not ask* the Board to reconsider its decision with respect to representative claim 20, it now charges that the Board failed to reconsider its decision with respect to that representative claim. Under 37 C.F.R. § 1.197, an appellant must state with particularity the points believed to have been misapprehended or overlooked by the Board in rendering its decision. If Baggett believed that the Board needed to review its decision with respect to representative claim 20 (which would then apply to claim 41), it should have specifically asked the Board to reconsider its decision with respect to that claim. 37 C.F.R. § 1.197.

Nonetheless, because both the Board and the Examiner misread the term "memoization" in the Group 9 claims, it did not have a chance to determine whether requiring memoization (which was coined in 1968 and used in a variety of computing contexts since then) renders claims 9 and 20 patentable over the prior

art. Representative claim 20, the only claim in Baggett's Group 4 before this Court, should therefore be remanded to the Board for appropriate action.

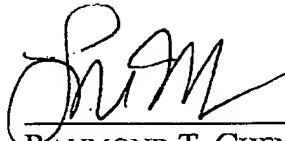
VI. CONCLUSION

Substantial evidence supports the conclusion that representative claims 1 and 11 are obvious over Gardner, the ATPCO manual and the admitted prior art. Substantial evidence also supports the conclusion that representative claim 2 is obvious over Gardner, the ATPCO manual, the admitted prior art, Tremblay and Wiederhold. The Board's decision should therefore be affirmed for these claims.

This Court should also remand representative claim 20 to the Board.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on February 2, 2009, I caused two copies of the foregoing BRIEF FOR APPELLEE-DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE to be served by United States mail (first-class, postage prepaid), addressed as follows:


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I certify under FRAP 32(a)(7) that the foregoing brief complies with the type-volume limitation. The total number of words in the foregoing brief, excluding the Table of Contents and Table of Authorities, is 7,809, as calculated by the Word program.



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